

MarineLab 3 Day, 2 Night Standard Program

Alabama Courses of Study

Science - Grades 9 - 12

STANDARD	AL.2.	Biology Core - Students will:
OBJECTIVE	2.1.	Select appropriate laboratory glassware, balances, time measuring equipment, and optical instruments to conduct an experiment. Astronomy/Plankton Tow Coral Reef Ecology
		Field Identification of Reef Fish Invertebrate Diversity
OBJECTIVE	2.1.c.	Additional Minimum Content: Identifying safe laboratory procedures when handling chemicals and using Bunsen burners and laboratory glassware Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish
		Invertebrate Diversity Mangrove ecology
OBJECTIVE	2.3.	Identify reactants and products associated with photosynthesis and cellular respiration and the purposes of these two processes. Seagrass ecology
OBJECTIVE	2.4.c.	Additional Minimum Content: Identifying various technologies used to observe cells. Examples: light microscope, scanning electron microscope, transmission electron microscope Astronomy/Plankton Tow
OBJECTIVE	2.6.b.	Additional Minimum Content: Comparing sexual and asexual reproduction Coral Reef Ecology
		Mangrove ecology
OBJECTIVE	2.9.	Differentiate between the previous five-kingdom and current six-kingdom classification systems. Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish
		Invertebrate Diversity Mangrove ecology Seagrass ecology
OBJECTIVE	2.9.c.	Additional Minimum Content: Identifying ways in which organisms from the Monera, Protista, and Fungi kingdoms are beneficial and harmful. Examples: beneficial - decomposers, harmful - diseases Seagrass ecology
OBJECTIVE	2.10.	Distinguish between monocots and dicots, angiosperms and gymnosperms, and vascular and nonvascular plants. Astronomy/Plankton Tow Mangrove ecology
		Seagrass ecology
OBJECTIVE	2.10.a.	Additional Minimum Content: Describing the histology of roots, stems, leaves, and flowers Mangrove ecology
		Seagrass ecology
OBJECTIVE	2.10.b.	Additional Minimum Content: Recognizing chemical and physical adaptations of plants. Examples: chemical - foul odor, bitter taste, toxicity; physical - spines, needles, broad leaves Astronomy/Plankton Tow Mangrove ecology
		Seagrass ecology

MarineLab 3 Day, 2 Night Standard Program

Alabama Courses of Study

Science - Grades 9 - 12

STANDARD	AL.2.	Biology Core - Students will:
OBJECTIVE	2.11.	Classify animals according to type of skeletal structure, method of fertilization and reproduction, body symmetry, body coverings, and locomotion. Examples: skeletal structure - vertebrates, invertebrates; fertilization - external, internal; reproduction - sexual, asexual; body symmetry - bilateral, radial, asymmetrical; body coverings - feathers, scales, fur; locomotion - cilia, flagella, pseudopodia Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Invertebrate Diversity Seagrass ecology
OBJECTIVE	2.12.	Describe protective adaptations of animals, including mimicry, camouflage, beak type, migration, and hibernation. Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Mangrove ecology
OBJECTIVE	2.13.	Trace the flow of energy as it decreases through the trophic levels from producers to the quaternary level in food chains, food webs, and energy pyramids. Astronomy/Plankton Tow Mangrove ecology Seagrass ecology
OBJECTIVE	2.13.a.	Additional Minimum Content: Describing the interdependence of biotic and abiotic factors in an ecosystem. Examples: effects of humidity on stomata size, effects of dissolved oxygen on fish respiration Coral Reef Ecology Mangrove ecology
OBJECTIVE	2.13.b.	Additional Minimum Content: Contrasting autotrophs and heterotrophs Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Mangrove ecology Seagrass ecology
OBJECTIVE	2.13.c.	Additional Minimum Content: Describing the niche of decomposers Mangrove ecology
OBJECTIVE	2.14.	Trace biogeochemical cycles through the environment, including water, carbon, oxygen, and nitrogen. Astronomy/Plankton Tow Mangrove ecology Seagrass ecology

MarineLab 3 Day, 2 Night Standard Program

Alabama Courses of Study

Science - Grades 9 - 12

STANDARD	AL.2.	Biology Core - Students will:
OBJECTIVE	2.14.a.	<p>Additional Minimum Content: Relating natural disasters, climate changes, nonnative species, and human activity to the dynamic equilibrium of ecosystems. Examples: natural disasters - habitat destruction resulting from tornadoes; climate changes - changes in migratory patterns of birds; nonnative species - exponential growth of kudzu and Zebra mussels due to absence of natural controls; human activity - habitat destruction resulting in reduction of biodiversity, conservation resulting in preservation of biodiversity</p> <p style="text-align: center;"> Astronomy/Plankton Tow Invertebrate Diversity </p> <p style="text-align: center;"> Coral Reef Ecology Mangrove ecology </p> <p style="text-align: center;"> Field Identification of Reef Fish Seagrass ecology </p>
OBJECTIVE	2.14.b.	<p>Additional Minimum Content: Describing the process of ecological succession</p> <p>Seagrass ecology</p>
OBJECTIVE	2.15.	<p>Identify biomes based on environmental factors and native organisms. Example: tundra - permafrost, low humidity, lichens, polar bears</p> <p style="text-align: center;"> Astronomy/Plankton Tow Invertebrate Diversity </p> <p style="text-align: center;"> Coral Reef Ecology Mangrove ecology </p> <p style="text-align: center;"> Field Identification of Reef Fish Seagrass ecology </p>
OBJECTIVE	2.16.a.	<p>Additional Minimum Content: Discriminating among symbiotic relationships, including mutualism, commensalism, and parasitism</p> <p style="text-align: center;"> Coral Reef Ecology Mangrove ecology </p> <p style="text-align: center;"> Field Identification of Reef Fish Seagrass ecology </p>
STANDARD	AL.5.	Aquascience Elective Core - Students will:
OBJECTIVE	5.1.	<p>Differentiate among freshwater, brackish water, and saltwater ecosystems.</p> <p style="text-align: center;"> Astronomy/Plankton Tow Invertebrate Diversity </p> <p style="text-align: center;"> Coral Reef Ecology Mangrove ecology </p> <p style="text-align: center;"> Field Identification of Reef Fish Seagrass ecology </p>
OBJECTIVE	5.1.a.	<p>Additional Minimum Content: Identifying chemical, geological, and physical features of aquatic ecosystems</p> <p style="text-align: center;"> Astronomy/Plankton Tow Invertebrate Diversity </p> <p style="text-align: center;"> Coral Reef Ecology Mangrove ecology </p> <p style="text-align: center;"> Field Identification of Reef Fish Seagrass ecology </p>
OBJECTIVE	5.2.	<p>Relate geological and hydrological phenomena and fluid dynamics to aquatic systems.</p> <p style="text-align: center;"> Astronomy/Plankton Tow Invertebrate Diversity </p> <p style="text-align: center;"> Coral Reef Ecology Mangrove ecology </p> <p style="text-align: center;"> Field Identification of Reef Fish Seagrass ecology </p>

MarineLab 3 Day, 2 Night Standard Program

Alabama Courses of Study

Science - Grades 9 - 12

STANDARD	AL.6.	Botany Elective Core - Students will:
OBJECTIVE	6.6.b.	Additional Minimum Content: Analyzing the roles of capillarity and turgor pressure Mangrove ecology Seagrass ecology
OBJECTIVE	6.7.	Explain plant cell processes, including light dependent and light independent reactions of photosynthesis, glycolysis, aerobic and anaerobic respiration, and transport. Mangrove ecology Seagrass ecology
OBJECTIVE	6.9.	Identify life cycles of mosses, ferns, gymnosperms, and angiosperms. Mangrove ecology
OBJECTIVE	6.11.	Describe various natural and artificial methods of vegetative propagation. Examples: natural - stem runners, rhizomes, bulbs, tubers; artificial - cutting, grafting, layering Coral Reef Ecology Mangrove ecology
STANDARD	AL.7.	Earth and Space Science Elective Core - Students will:
OBJECTIVE	7.4.	Describe the production and transfer of stellar energies. Astronomy/Plankton Tow
OBJECTIVE	7.8.	Explain the terms astronomical unit and light year. Astronomy/Plankton Tow
OBJECTIVE	7.11.	Describe pulsars, quasars, black holes, and galaxies. Astronomy/Plankton Tow
STANDARD	AL.8.	Environmental Science Elective Core - Students will:
OBJECTIVE	8.1.	Identify the influence of human population, technology, and cultural and industrial changes on the environment. Coral Reef Ecology Seagrass ecology Mangrove ecology
OBJECTIVE	8.4.a.	Additional Minimum Content: Identifying layers of the atmosphere and the composition of air Seagrass ecology
OBJECTIVE	8.6.b.	Additional Minimum Content: Describing the use of chemicals and microorganisms in water treatment Coral Reef Ecology Seagrass ecology Mangrove ecology
OBJECTIVE	8.6.c.	Additional Minimum Content: Describing water conservation methods Mangrove ecology
OBJECTIVE	8.6.e.	Additional Minimum Content: Identifying major residential, industrial, and agricultural water consumers Mangrove ecology

MarineLab 3 Day, 2 Night Standard Program

Alabama Courses of Study

Science - Grades 9 - 12

STANDARD	AL.8.	Environmental Science Elective Core - Students will:
OBJECTIVE	8.6.f.	Additional Minimum Content: Identifying principal uses of water Mangrove ecology
OBJECTIVE	8.7.	Identify reasons coastal waters serve as an important resource. Examples: economic stability, biodiversity, recreation Invertebrate Diversity Mangrove ecology Seagrass ecology
OBJECTIVE	8.7.a.	Additional Minimum Content: Classifying biota of estuaries, marshes, tidal pools, wetlands, beaches, and inlets Invertebrate Diversity Mangrove ecology Seagrass ecology
OBJECTIVE	8.7.b.	Additional Minimum Content: Comparing components of marine water to components of inland bodies of water Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Invertebrate Diversity Mangrove ecology
OBJECTIVE	8.10.	Describe the composition of soil profiles and soil samples of varying climates. Seagrass ecology
OBJECTIVE	8.11.a.	Additional Minimum Content: Describing methods for preventing soil erosion. Examples: planting vegetation, constructing terraces, providing barriers Coral Reef Ecology Mangrove ecology Seagrass ecology
OBJECTIVE	8.12.	Identify positive and negative effects of human activities on biodiversity. Coral Reef Ecology Mangrove ecology Seagrass ecology
OBJECTIVE	8.12.a.	Additional Minimum Content: Identifying endangered and extinct species locally, regionally, and worldwide Coral Reef Ecology Mangrove ecology Seagrass ecology
OBJECTIVE	8.12.b.	Additional Minimum Content: Identifying causes for species extinction locally, regionally, and worldwide Coral Reef Ecology Mangrove ecology Seagrass ecology
STANDARD	AL.10.	Genetic Elective Core - Students will:
OBJECTIVE	10.4.a.	Additional Minimum Content: Comparing spermatogenesis and oogenesis using charts Coral Reef Ecology Mangrove ecology

MarineLab 3 Day, 2 Night Standard Program

Alabama Courses of Study

Science - Grades 9 - 12

STANDARD	AL. 13.	Marine Science Elective Core - Students will:
OBJECTIVE	13.3.	Describe physical characteristics of oceans, including topography of the ocean floor, plate tectonics, wave motion, depth, and pressure. Coral Reef Ecology
OBJECTIVE	13.4.a.	Additional Minimum Content: Describing how waves, ocean currents, and tides are generated Field Identification of Reef Fish
OBJECTIVE	13.5.	Discuss physical and chemical properties of saltwater. Examples: physical - turbidity, temperature, density; chemical - salinity, pH, dissolved gases Coral Reef Ecology
OBJECTIVE	13.6.	Describe components of major marine ecosystems, including estuaries, coral reefs, benthic communities, and open-ocean communities. Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Invertebrate Diversity Keys Habitats - Introduction and Mangrove ecology Seagrass ecology
OBJECTIVE	13.7.	Identify patterns and interrelationships among producers, consumers, scavengers, and decomposers in a marine ecosystem. Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Invertebrate Diversity Mangrove ecology Seagrass ecology
OBJECTIVE	13.8.	Describe characteristics of marine plant and algae divisions. Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Mangrove ecology Seagrass ecology
OBJECTIVE	13.8.a.	Additional Minimum Content: Describing commercial, economical, and medicinal values of marine plants and algae Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Mangrove ecology Seagrass ecology
OBJECTIVE	13.9.	Arrange various forms of marine life from most simple to most complex. Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Invertebrate Diversity Mangrove ecology Seagrass ecology

MarineLab 3 Day, 2 Night Standard Program

Alabama Courses of Study

Science - Grades 9 - 12

STANDARD	AL. 13.	Marine Science Elective Core - Students will:
OBJECTIVE	13.11.	Describe positive and negative effects of human influence on marine environments. Examples: positive - reef restoration, protection of endangered species; negative - pollution, overfishing Coral Reef Ecology Mangrove ecology Seagrass ecology
STANDARD	AL. 14.	Zoology Elective Core - Students will:
OBJECTIVE	14.4.	Use taxonomic groupings to differentiate the structure and physiology of invertebrates with dichotomous keys. Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Invertebrate Diversity Mangrove ecology Seagrass ecology
OBJECTIVE	14.4.a.	Additional Minimum Content: Identifying examples and characteristics of Porifera Coral Reef Ecology Mangrove ecology Seagrass ecology
OBJECTIVE	14.4.b.	Additional Minimum Content: Identifying examples and characteristics of Cnidaria Coral Reef Ecology Field Identification of Reef Fish Seagrass ecology
OBJECTIVE	14.4.c.	Additional Minimum Content: Identifying examples and characteristics of Mollusca Coral Reef Ecology Invertebrate Diversity Mangrove ecology Seagrass ecology
OBJECTIVE	14.4.d.	Additional Minimum Content: Identifying examples and characteristics of worms, including Platyhelminthes, Nematoda, and Annelida Coral Reef Ecology Invertebrate Diversity Mangrove ecology Seagrass ecology
OBJECTIVE	14.4.e.	Additional Minimum Content: Identifying examples, characteristics, and life cycles of Arthropoda Astronomy/Plankton Tow Invertebrate Diversity Mangrove ecology Seagrass ecology
OBJECTIVE	14.4.f.	Additional Minimum Content: Identifying examples and characteristics of Echinodermata Coral Reef Ecology Invertebrate Diversity Mangrove ecology Seagrass ecology
OBJECTIVE	14.5.	Use taxonomic groupings to differentiate structure and physiology of vertebrates with dichotomous keys. Field Identification of Reef Fish Mangrove ecology Seagrass ecology
OBJECTIVE	14.5.a.	Additional Minimum Content: Identifying examples and characteristics of the three classes of fish Field Identification of Reef Fish Mangrove ecology Seagrass ecology

MarineLab 3 Day, 2 Night Standard Program

Alabama Courses of Study

Science - Grades 9 - 12

STANDARD	AL. 14.	Zoology Elective Core - Students will:
OBJECTIVE	14.5.c.	Additional Minimum Content: Identifying examples and characteristics of Reptilia Seagrass ecology
OBJECTIVE	14.5.d.	Additional Minimum Content: Identifying examples and characteristics of Aves Mangrove ecology
OBJECTIVE	14.6.	Identify factors used to distinguish species, including behavioral differences and reproductive isolation. Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Invertebrate Diversity Mangrove ecology Seagrass ecology
OBJECTIVE	14.7.	Explain how species adapt to changing environments to enhance survival and reproductive success, including changes in structure, behavior, or physiology. Examples: aestivation, thicker fur, diurnal activity Astronomy/Plankton Tow Coral Reef Ecology Field Identification of Reef Fish Mangrove ecology Seagrass ecology
OBJECTIVE	14.8.	Differentiate among organisms that are threatened, endangered, and extinct. Examples: threatened - bald eagle, endangered - California condor, extinct - dodo Coral Reef Ecology Mangrove ecology Seagrass ecology
OBJECTIVE	14.8.a.	Additional Minimum Content: Identifying causative factors of decreasing population size. Examples: overcrowding resulting in greater incidence of disease, fire destroying habitat and food sources Astronomy/Plankton Tow Coral Reef Ecology Mangrove ecology Seagrass ecology
OBJECTIVE	14.9.	Analyze a field study of animal behavior patterns to determine the relationship of these patterns to an animal's niche. Astronomy/Plankton Tow Invertebrate Diversity Mangrove ecology Seagrass ecology

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